Interoffice Memorandum 38

To: Hank Farrow

Copies To: Craig Harlen

File Reference:

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From: Kim Mills

Department: Acid Production

Location: C. F. White Plant
Conda, Idaho

Subject:

During the last twelve months, the frequency of acid leaks in the cooling basins of both the west and east sulfuric plants has increased. This shows the condition of the basins is deteriorating and will continue to do so until the cause of the acid leaks is corrected.

The solution to substantially reducing acid leaks is an extensive rebuilding of the acid cooling basins. Replacement of components would initially be concentrated on those in the worst condition with a program set up to eventually replace all original parts of the basin. While any effort to rebuild these basins is expensive, such a program is financially feasible in terms of decreased downtime and lower maintenance and production costs. Also to be considered is the lost phosphoric acid production resulting from the inability to purchase additional sulfuric acid to cover production losses.

The major cause of downtime in both sulfuric plants is acid leaks in the cooling basins. In the east plant, 53.5% of the total downtime for the year was caused by acid leaks. This percentage of downtime has increased to 61% in the last four months. A total of 71% of the downtime in the west plant was attributed to acid leaks with this percentage remaining fairly constant throughout the last twelve months. Downtime is expensive in both lost production and damage done to the sulfuric plants by an excessive number of shut downs.

Production of sulfuric acid lost over the last twelve months due to acid leaks in the cooling basins was 10,730 tons. This figure takes into consideration production lost while shut down completely and reduced rates incurred on startup and while making partial repairs. The value of the lost production is $203,870.00, using the current cost of $19.00/Ton sulfuric acid. In the future, production losses will be even greater due to a pending Environmental Protection Agency ruling that excess SO_2 emissions during production upsets (startup/shut down) will have to be compensated for by reduced emissions during normal production. This can only be accomplished by further reducing rates.

The damage caused to the sulfuric acid plants by an abnormal number of shut downs/startups cannot be shown quantitatively. However, various components of the plants suffer reduced life expectancy due to the changes from a steady state. The components affected most are the catalyst in the converter, the SO_2/SO_3 gas ducts and the Brinks demisters in the absorbing tower. The Brinks are probably affected most as the acid strength in the absorbing tower usually drops below 95% for a short time during the startup cycle thus causing excessive corrosion to the Brinks tube sheet.

The cost of chemicals to neutralize the effects of acid leaks is also significant. Liquid caustic and soda ash are purchased for control purposes and cost approximately $102,400 per year.

Maintenance costs directly attributed to acid leaks in the cooling basins or the results of those leaks have been $47,350 for the last twelve months. This was $18,400 for direct materials and $28,950 for labor.

The below budget production caused by acid leaks in the basins has had a noticeable effect on phosphoric acid production. While below budget sulfuric production was not solely due to downtime from acid leaks, they did contribute directly to about one-third of the production lost. This in turn reduced the sulfuric acid available to phosphoric acid by 2,700 tons which equates to 30% phos acid production of 1,040 tons. At $136.00 per ton of phos acid, this reduction in phos acid produced was a loss amounting to $144,140 during September, October, and November, 1977. Only these months were considered since they covered the specific period of the year when sulfuric acid shortages were most critical.

A two step program will have to be initiated for prevention of the acid leaks. First, the cooling water system, the acid subheaders and the cooling coils will have to be replaced or repaired as necessary. Second, all the cooling coils will have to be replaced over the next three years concentrating initially on replacing the worst ones first.

The following components in the west sulfuric acid cooling basin would have to be replaced. These costs include labor, materials and overhead.

1. The complete acid subheader system.
   This is scheduled to be done during the 1978 turnaround. This will cost approximately $65,000.

2. Seventy-five percent of the cooling water system .
   This is estimated to cost $56,000.

3. One-third of the cooling coils.
   This is estimated to cost $121,000.

The following components in the east sulfuric cooling basin would have to be replaced. These costs include labor, materials and overhead.

1. The complete cooling water system.
   This project has already been started and is estimated to cost $100,000.

2. Forty percent of the acid subheader system.
   The parts replaced would be mainly tee's, elbows, and bolts. This is estimated to cost $29,000.

3. One-third of the coils.
   This is estimated to cost $151,500.

The comparison of the expense to rebuild the cooling basins versus the directly attributable costs of the acid leaks is as follows:

EXPENSE TO REBUILD BASINS

Rebuild East Basin - $280,500 -100,000 = $180,500 ($100,000 already spent)

Rebuild West Basin - $242,000 -65,000 = $177,000 ($65,000 scheduled for 1978 turnaround)

Total - $522,500 - $165,000 = $357,500 additional

COST OF ACID LEAKS

Lost sulfuric acid production	-	$203,870
Chemicals (basin pH control)	-	74,500
Maintenance Cost	-	47,350
Lost Phos Acid Production	-	144,140
Total		$469,860

The replacement of these components would prevent a majority of leaks in both basins. However, a continuing program to replace the remaining coils over the next two years will be necessary. This program would cost $151,500 per year for the east plant and $121,000 per year for the west plant. The work would be done during each plant's respective turnaround.

CM/kjp